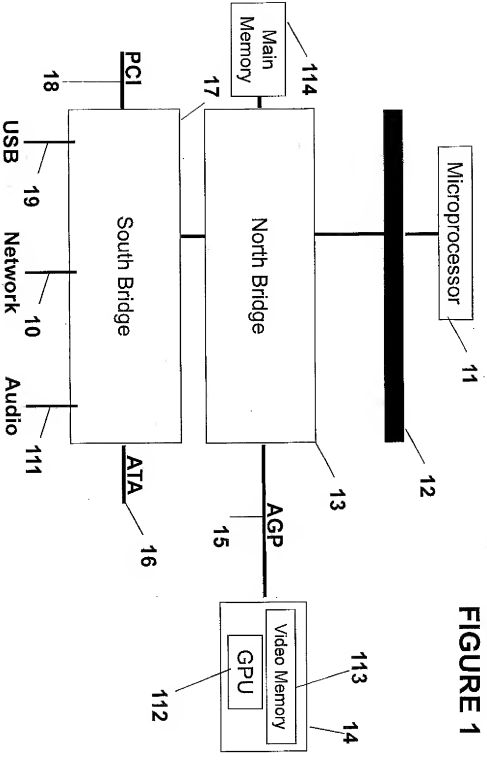
Microprocessor
11
12
Main Memory
114
North Bridge
13
17
PCI
18
South Bridge
USB
19
Network
10
Audio
111
ATA
16
AGP
15
Video Memory
113
GPU
112
14

FIGURE 1

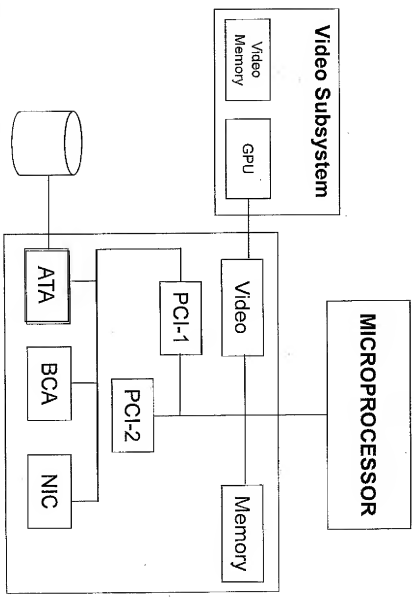
24
MICROPROCESSOR
Video Subsystem
Video Memory
GPU
Video
PCI-1
PCI-2
Memory
ATA
BCA
NIC

FIGURE 2(a)

25
Microprocessor
Video
Memory
Hyper Transport
HT to PCI Bridge
Video Subsystem
Video Memory
GPU
ATA
USB
1394
NIC

FIGURE 2(b)

35
39 Application A
310 iPhoto
311 Quicken
312 iMovie
313 Application B
34
Application Frameworks & Services
33
36 Open GL
37 Resources
38 Resources
32
O/S Core Services
31
O/S Kernal
C100
3(a)
327
314 Application A
315 iPhoto
316 Quicken
317 iMovie
318 Application B
326
Application Frameworks & Services
325
319 Other Graphics Resource
320 Open GL
321 Other Graphics Resource
3(b)
324
Other Resource
Graphics Compositor
Other Resource
323
O/S Core Services
322
O/S Kernal
C101

FIGURE 3

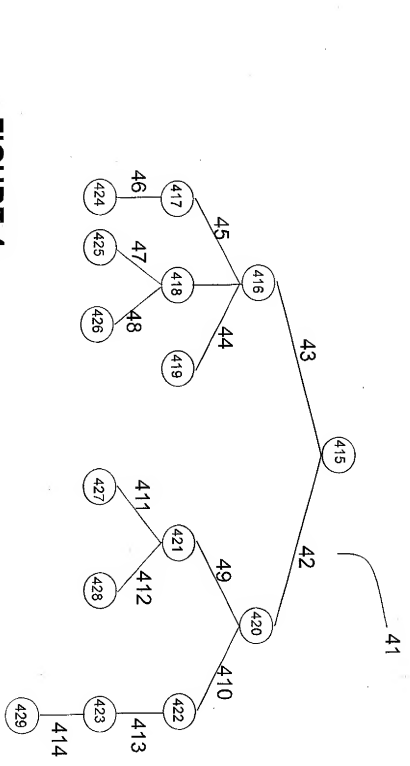
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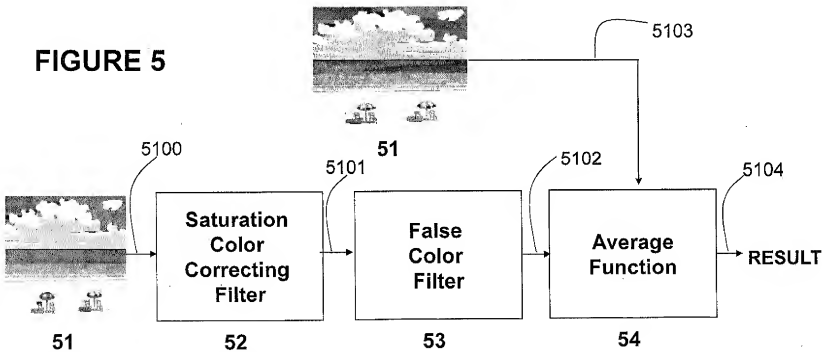
FIGURE 4

FIGURE 5



High-level Code Examples:

1. Allocate 51
2. Apply 52 to 51, parameters = (X, Y, Z, W), input = 51 (Sea Shore image), output = [place holder] CC sea shore
3. Apply 53, parameters (X, Y, Z, W), input = cc sea shore, output = [place holder] FC CC sea shore
4. Apply 54, parameters (X, Y, Z, W), input buffer 53, input Sea Shore image, output = [place holder] sea shore result

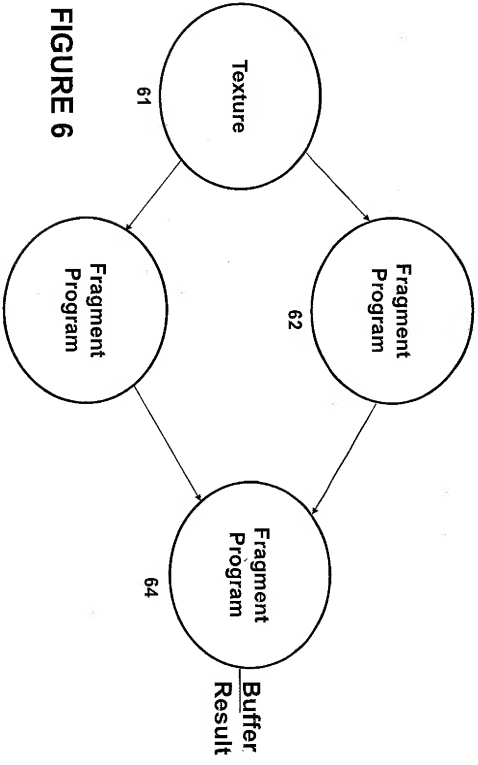

Texture
61
Fragment Program
62
Fragment Program
63
Fragment Program
64
Buffer Result

FIGURE 6

7100
Receive Graphics Task
7101
Create Low-Level Graph
7102
Node Reduction
7103
DOD/ROI Optimization
7104
Compile
7105
Render
CPU
GPU

FIGURE 7

8100: Combine
8101 Cached?
Yes Cached Yes Combine
Y
8103 Perform Combine using cached result
Yes Cached No Combine
N
Not Cached
8104 Next Node
8102 Combine Possible?
N
Y
8106 Perform Combine
8105 Cache fact of whether combine is possible

FIGURE 8

8100 Output of 1st node = input of 2nd node
Y
N
8101 Check/change each line
Y
N
8102 Hardware can handle new program?
Y
N
8103 DON'T COMBINE
8104 Concatenate
8105 standard Optimization
8106 Allocate Registers
8107 Cache Results

FIGURE 9

10107 Next Line
10100 Local Variable?
Y
N
10101 Rename
10102 Texture Reference?
Y
N
10103 Is It Output Of First Program?
Y
N
10104 Replace Texture with pixel
10108 Rename
10105 Reference to different bit in source texture?
Y
N
10106 Abort

FIGURE 10

116
115
113
114
115
112
118
114
112
111
111
11(a)
Result ROI
11100
Create A Low Level Graph
11101
Determine Result Intersection
11102
More
Nodes?
N
Y
11103
DONE!
11104 Determine
Next ROI
11(b)

Figure 11

12100
Try To Combine Adj. Node
CPU
12101
Compute DOD of (Merged) Node
CPU
12102
Compute ROI of Children
CPU
12103
Generate Textures for Children
CPU/GPU
12104
Create Buffer's for Result
CPU
12105
Render To Buffer, using merged node's program and textures from step Q103
GPU

FIGURE 12

14100: Global DOD/ROI Intersection
14101 Next Node?
N
14106 Done!
Y
14102: Get Input ROI
Y
14103 Check Cache
N
14104 – Allocate Buffer for ROI
14105 Render?
N
Y
14107 Combine?
N
Y
14112: combine
14108: ROI/ DOD Optimize
14109: Compile
14110: Render (GPU)
14111: Consider Memory Efficiency

FIGURE 14

CPU	GPU
Time 1	Frame 1	Prior Task
Time 2	Frame 2	Frame 1
Time 3	Frame 3	Frame 2
Time 4	Frame 4	Frame 3
Time 5	Frame 5	Frame 4
Time 6	Frame 6	Frame 5
Time 7	Frame 7	Frame 6

15(a)

P1	P2	P3	P4
Time 1	Frame 1			
Time 2	Frame 2	Frame 1		
Time 3	Frame 3	Frame 2	Frame 1	
Time 4	Frame 4	Frame 3	Frame 2	Frame 1
Time 5	Frame 5	Frame 4	Frame 3	Frame 2
Time 6	Frame 6	Frame 5	Frame 4	Frame 3
Time 7		Frame 6	Frame 5	Frame 4

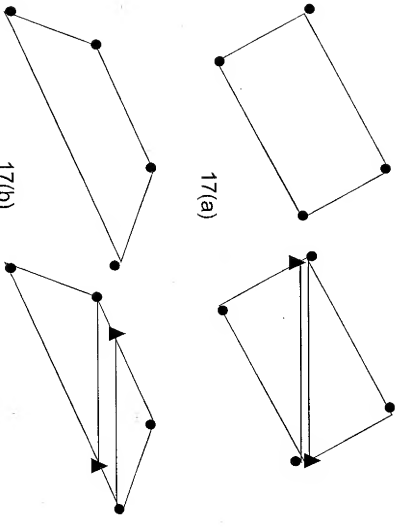
15(b)

FIGURE 15(a) & 15(b)

	CPU	GPU
Time 1	Frame 1, effect 1	
Time 2	Frame 2, effect 1	Frame 1, effect 2
Time 3	Frame 1, effect 3	Frame 2, effect 2
Time 4	Frame 2, effect 3	Frame 1, effect 4
Time 5	Frame 3, effect 1	Frame 2, effect 4
Time 6	Frame 4, effect 1	Frame 3, effect 2
Time 7	Frame 3, effect 3	Frame 4, effect 2
Time 8	Frame 4, effect 3	Frame 3, effect 4
		Frame 4, effect 4

FIGURE 15(c)

15(c)



Figures 17(a) & 17(b)